# CR-91 Event – Shelby County, AL
# Preliminary Air Monitoring Summary
# September 20, 2016 05:00

*Prepared by*
*Center for Toxicology and Environmental Health, L.L.C. (CTEH®)*
*On Behalf of Colonial Pipeline*

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Sound Scientific Solutions

## *Introduction*

On September 9, 2016, the Center for Toxicology and Environmental Health, L.L.C. (CTEH®) initiated air monitoring in support of response efforts to the gasoline release in Shelby County, AL. This report presents the real-time air monitoring data recorded from September 19 2016 05:00 to September 20, 2016 05:00 CDT.

## *Real-Time Air Monitoring*[1]

Real-time air monitoring was conducted to evaluate the potential airborne presence of gasoline-associated constituents, if any, during response operations. All instrumentation was calibrated at least once per day or per manufacturer's recommendations. Target analytes were measured as total volatile organic compounds (VOCs), oxygen, benzene, gasoline, hexane, naphthalene, xylene, and flammability as the percent of the lower explosive limit (LEL) using remote telemetering RAESystems® AreaRAEs, hand-held instruments such as RAESystems® MultiRAE Pro/Plus' and UltraRAEs, as well as Gastec® colorimetric detection tubes.

During this monitoring period, six benzene, two LEL, and 15 VOC detections were recorded above the action level concentration during worker activity monitoring. During those instances when detections were sustained, workers were either wearing respiratory protection, or egressed the area in accordance with the approved sampling and analysis plan.

Table 1, below, presents the results of real-time air monitoring using hand-held instruments. Maps of the incident site location and locations of hand-held real-time air monitoring readings are provided in Appendix I.

[1] Real-time air monitoring refers to the use of hand-held instruments that provide near-instantaneous readings of an airborne chemical concentration without the need for laboratory analysis.

*Table 1: Hand-Held Real-Time Air Monitoring Summary*[1]

*September 19, 2016 05:00 to September 20, 2016 05:00*

| Location Category | Analyte | Instrument | Count of Readings | Count of Detections | Range of Detections[2,3] |
|---|---|---|---|---|---|
| Worker Activity Monitoring | Benzene | UltraRAE | 160 | 23 | 0.05 - 4.1 ppm |
| | Gasoline | Gastec #101L | 10 | 0 | <5 ppm |
| | Hexane | Gastec #102L | 8 | 0 | <1 ppm |
| | %LEL | MultiRAE Plus | 147 | 0 | <1 % |
| | | MultiRAE Pro | 267 | 2 | 4 - 9 % |
| | Naphthalene | Gastec #60 | 2 | 0 | <0.1 ppm |
| | Toluene | Gastec #122 | 8 | 0 | <1 ppm |
| | | Gastec #122L | 1 | 0 | <0.5 ppm |
| | VOCs | MultiRAE Plus | 133 | 16 | 0.1 - 31.4 ppm |
| | | MultiRAE Pro | 306 | 126 | 0.02 - 700 ppm |
| | Xylene | Gastec #123 | 9 | 0 | <1 ppm |

[1]Please Note: The data displayed in the above table has not undergone complete QC analysis and is presented in a preliminary format.
[2]Maximum detections preceded by the "<" symbol are considered non-detections below the instrument limit of detection (LoD) value to the right.
[3]Numbers are the raw values, no correction factors have been applied.

In addition to worker activity monitoring, remote telemetering equipment established as an early warning system recorded 14 detections of VOCs above the site-specific action level of 300 ppm and 3 detections of LEL above the LEL action level of 10% (3% as raw values on LEL sensors). **Table 2** (below) summarizes remote telemetering AreaRAE data for this monitoring period, which may contain drift events[2]. **Appendix I** and **Appendix II** include location maps and graphs for remote telemetering data, respectively.

[2] Drift is defined as any interference in the PID's or electrochemical sensor's ability to accurately report the concentration of a chemical in the atmosphere. Humidity, rapid temperature changes, and compromised batteries are examples of common sources of drift.

*Table 2: Remote Telemetering Real-time Air Monitoring Summary[1,3]*

*September 19, 2016 05:00 to September 20, 2016 05:00*

| Unit | Location Description | Analyte | Count of Readings | Count of Detections | Range of Detections[2] |
|---|---|---|---|---|---|
| AR01 | 2A Recovery | LEL | 4531 | 10 | 1.1 - 3.4 % |
| | | $O_2$ | 1836 | 1836 | 20.9 - 21.2 % |
| | | VOC | 4531 | 4002 | 0.1 - 701.2 ppm |
| AR04 | 2A Frac Tank Staging | LEL | 5179 | 0 | <1 % |
| | | $O_2$ | 1306 | 1306 | 20.9 - 20.9 % |
| | | VOC | 5179 | 2410 | 0.1 - 45.4 ppm |
| AR05 | 2A Compressors | LEL | 2282 | 0 | <1 % |
| | | $O_2$ | 1356 | 1356 | 20.9 - 20.9 % |
| | | VOC | 2282 | 1627 | 0.1 - 141.4 ppm |
| AR06 | East of Release Site/Near Stopple 2 | LEL | 5325 | 0 | <1 % |
| | | $O_2$ | 757 | 757 | 20.9 - 21.1 % |
| | | VOC | 5325 | 3694 | 0.1 - 189.3 ppm |
| AR07 | 2B Recovery | LEL | 5094 | 0 | <1 % |
| | | $O_2$ | 1634 | 1634 | 20.9 - 20.9 % |
| | | VOC | 5094 | 3946 | 0.1 - 88.1 ppm |
| AR08 | Main Staging Area Frac Tanks | LEL | 5185 | 0 | <1 % |
| | | $O_2$ | 867 | 867 | 20.9 - 20.9 % |
| | | VOC | 5185 | 2063 | 0.1 - 13.1 ppm |
| AR09 | Release Site | LEL | 3669 | 0 | <1 % |
| | | $O_2$ | 3669 | 3669 | 20.4 - 20.9 % |
| | | VOC | 3669 | 2838 | 0.1 - 402 ppm |
| AR10 | On path between Recovery 2A and Recovery 2B. | LEL | 4329 | 0 | <1 % |
| | | $O_2$ | 1365 | 1365 | 20.9 - 20.9 % |
| | | VOC | 4329 | 2941 | 0.1 - 100.5 ppm |
| AR11 | Main Staging Entrance East of TRG checkpoint | LEL | 5131 | 0 | <1 % |
| | | $O_2$ | 1176 | 1176 | 20.9 - 20.9 % |
| | | VOC | 5131 | 1503 | 0.1 - 12.7 ppm |
| AR12 | Boom Site #2 | LEL | 5758 | 0 | <1 % |
| | | $O_2$ | 2902 | 2902 | 20.9 - 21.4 % |
| | | VOC | 5758 | 1235 | 0.1 - 1.8 ppm |
| AR13 | TRG Checkpoint 2 - access to stopple 1, Recovery 2A and 2A Frac Tank Staging Area. | LEL | 5116 | 0 | <1 % |
| | | $O_2$ | 1250 | 1250 | 20.5 - 20.9 % |
| | | VOC | 5116 | 1547 | 0.1 - 12.2 ppm |
| AR14 | Cab of excavator at release site | LEL | 4801 | 0 | <1 % |
| | | $O_2$ | 844 | 844 | 20.9 - 20.9 % |
| | | VOC | 4801 | 2411 | 0.1 - 31.7 ppm |

[1]Please note: The data displayed here has not undergone complete QA/QC analysis and is presented in a preliminary format.

[2]Maximum detections preceded by the "<" symbol are considered at the limit of detection (LoD) value to the right.

[3]LEL and VOC values are raw values, correction factors have not been applied.

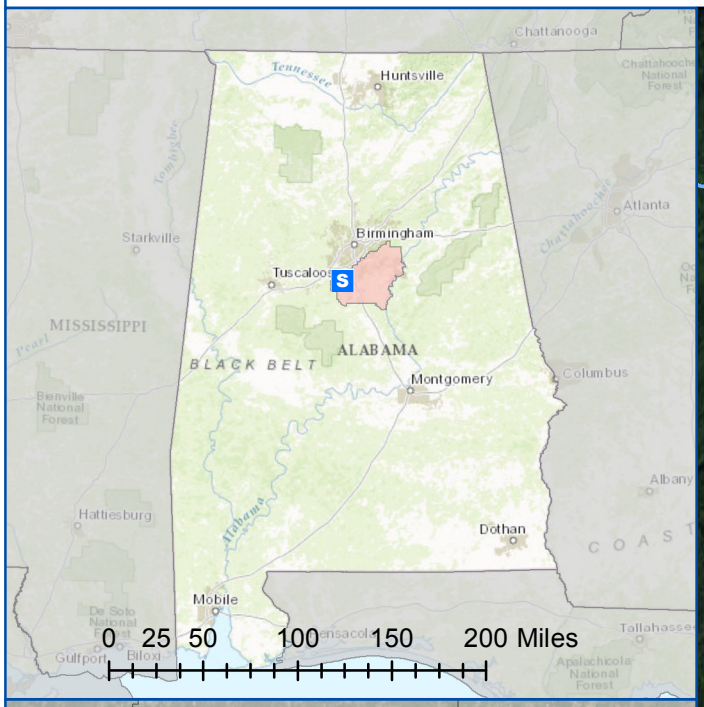
# Appendix I:

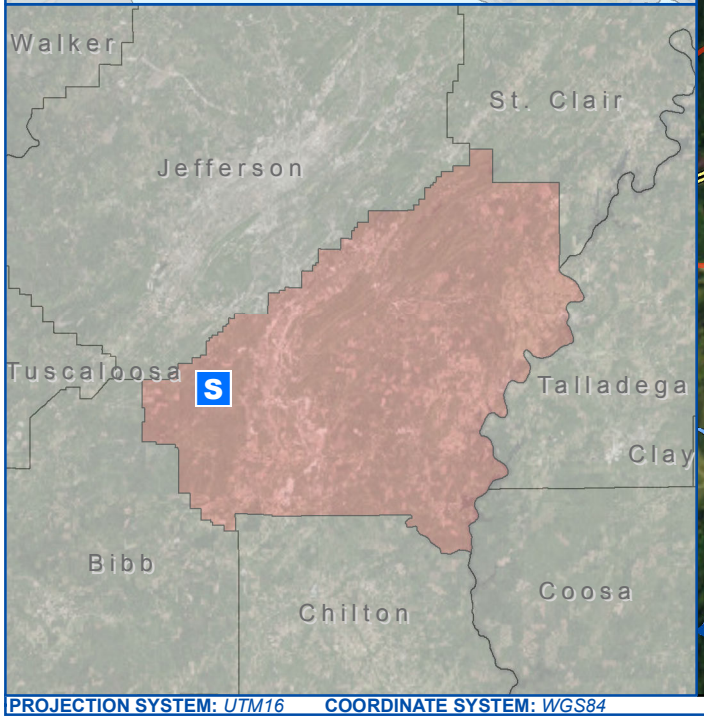
## Site Location, Hand-Held Real-Time Air Monitoring Location, and Remote Telemetering Air Monitoring Location Maps

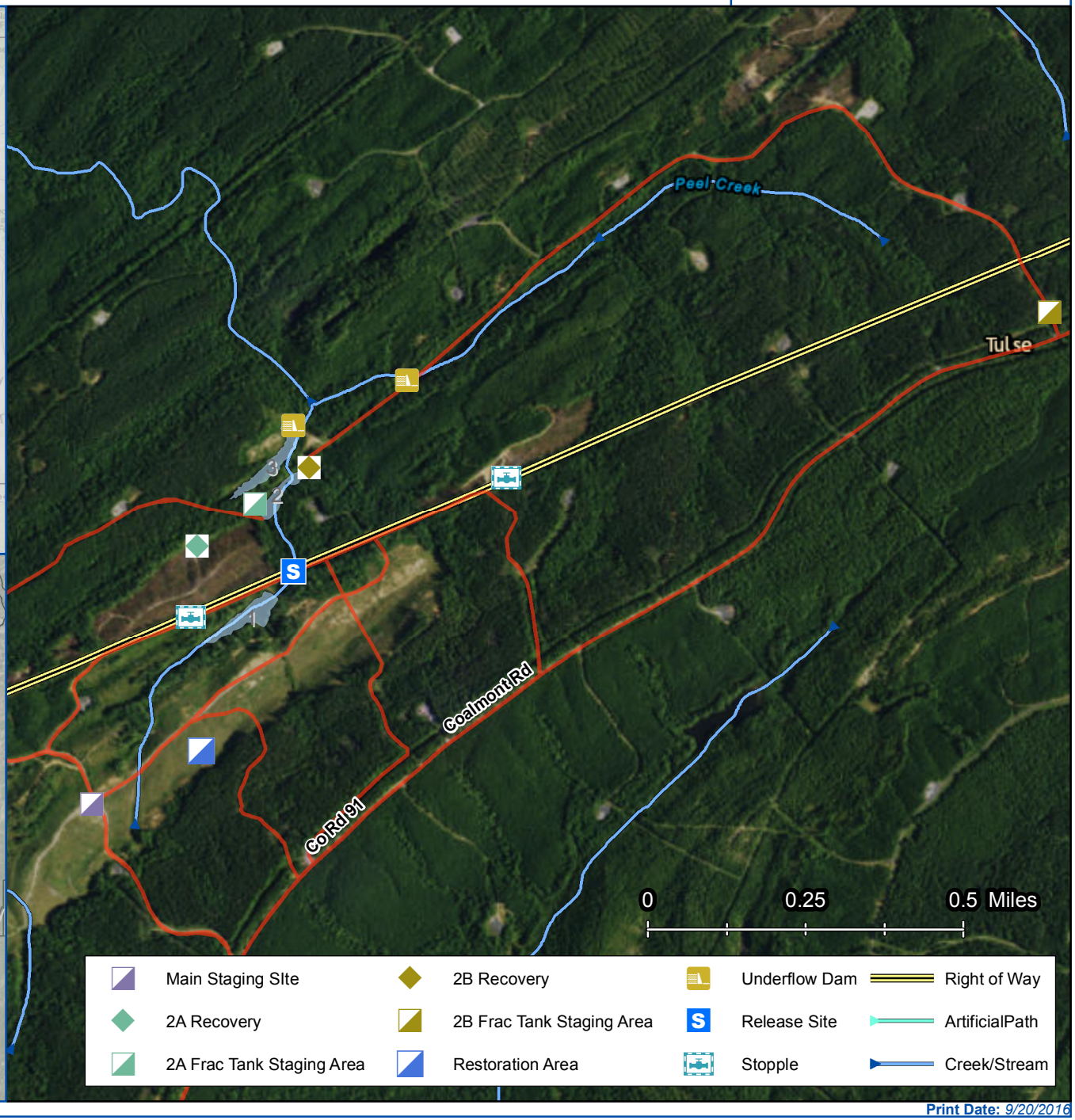
# CR-91 Event

*Site Location*

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



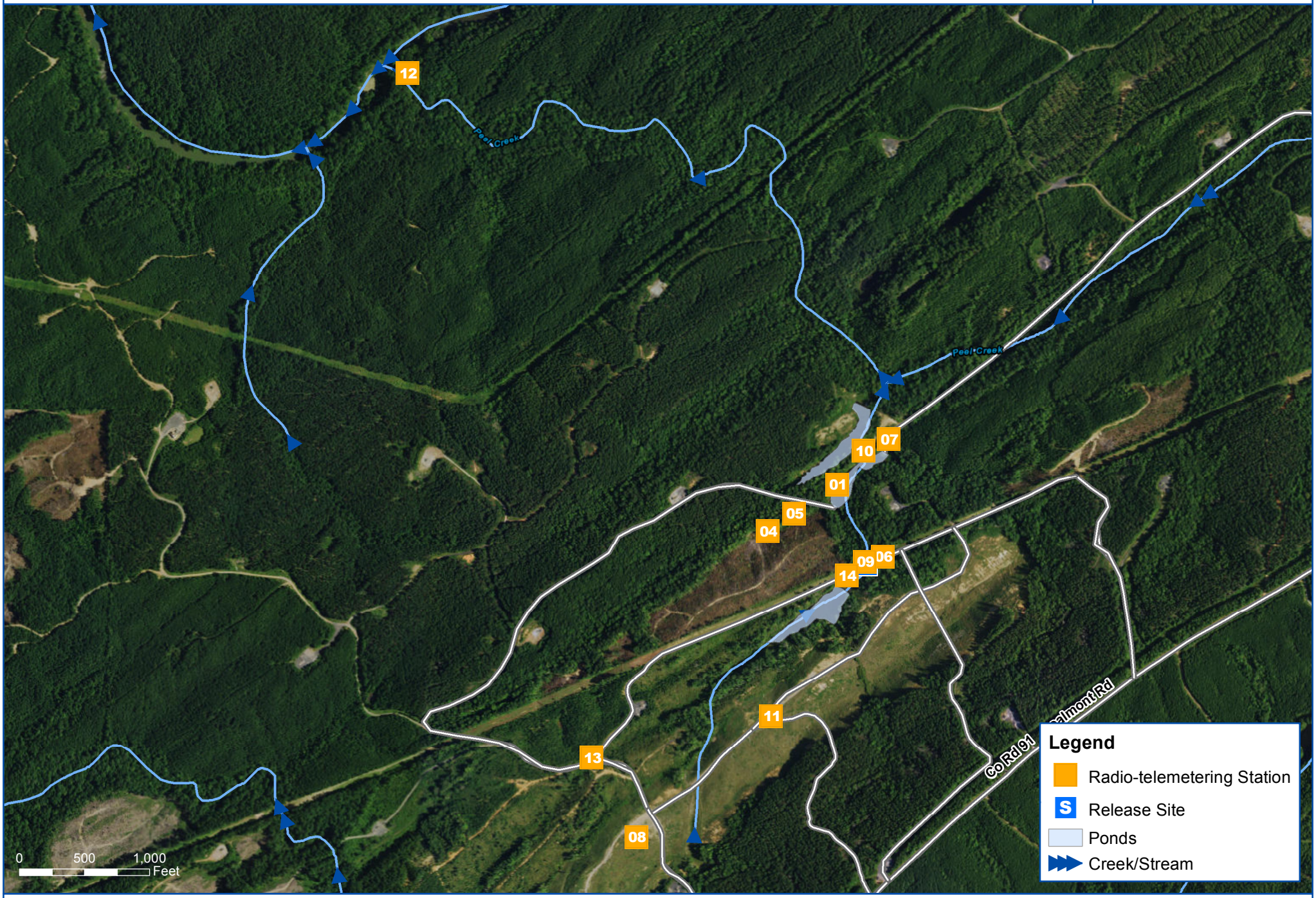




**PROJECTION SYSTEM:** *UTM16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/20/2016*

# Radio-telemetering Real-time Air Monitoring Station Locations

CR-91 Event 9/20/2016

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, LA

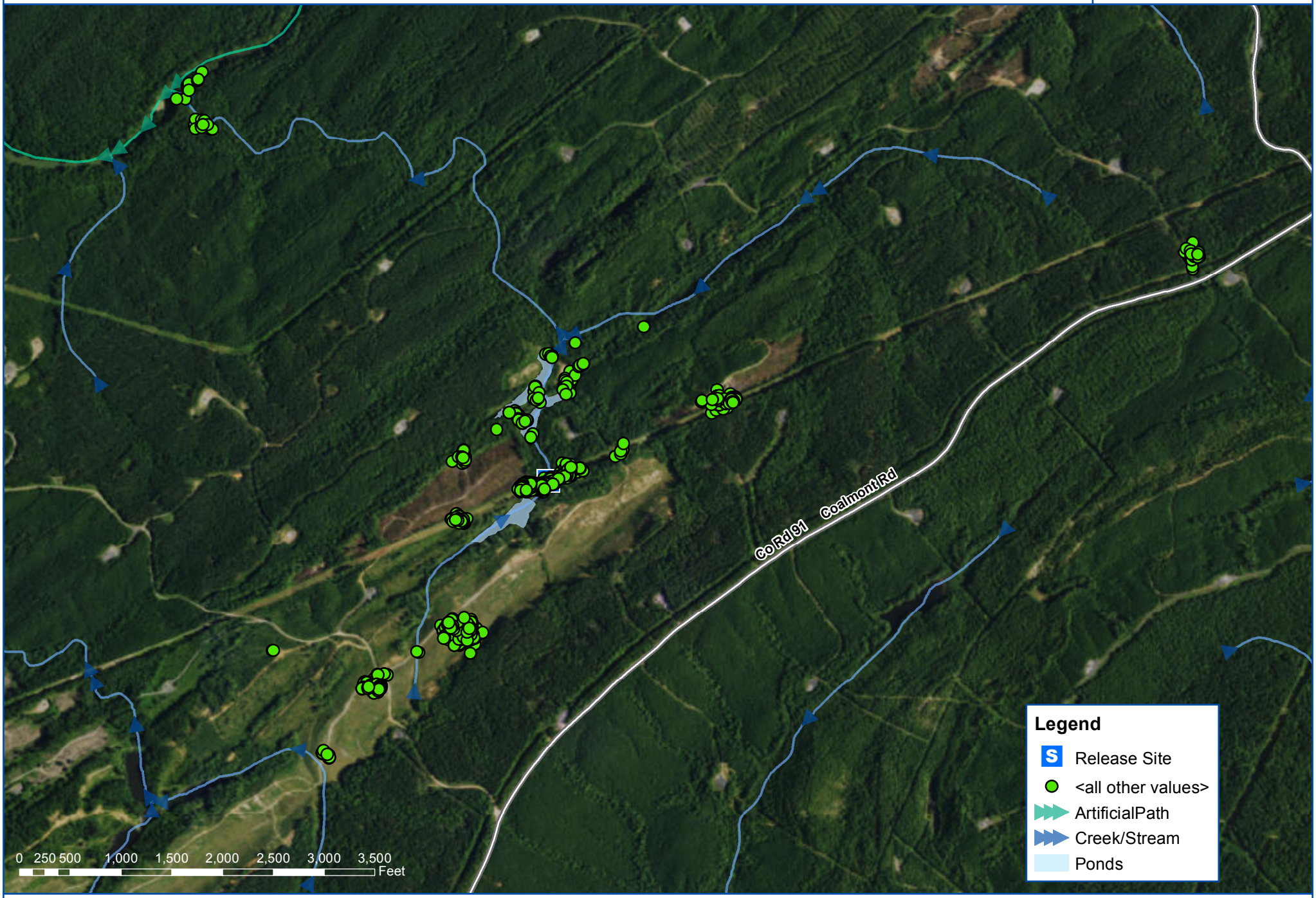



**PROJECTION SYSTEM:** *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/20/2016*

# Manually-Logged Real-Time Reading Locations

CR-91 Event | 09/19/2016 05:00 – 09/20/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



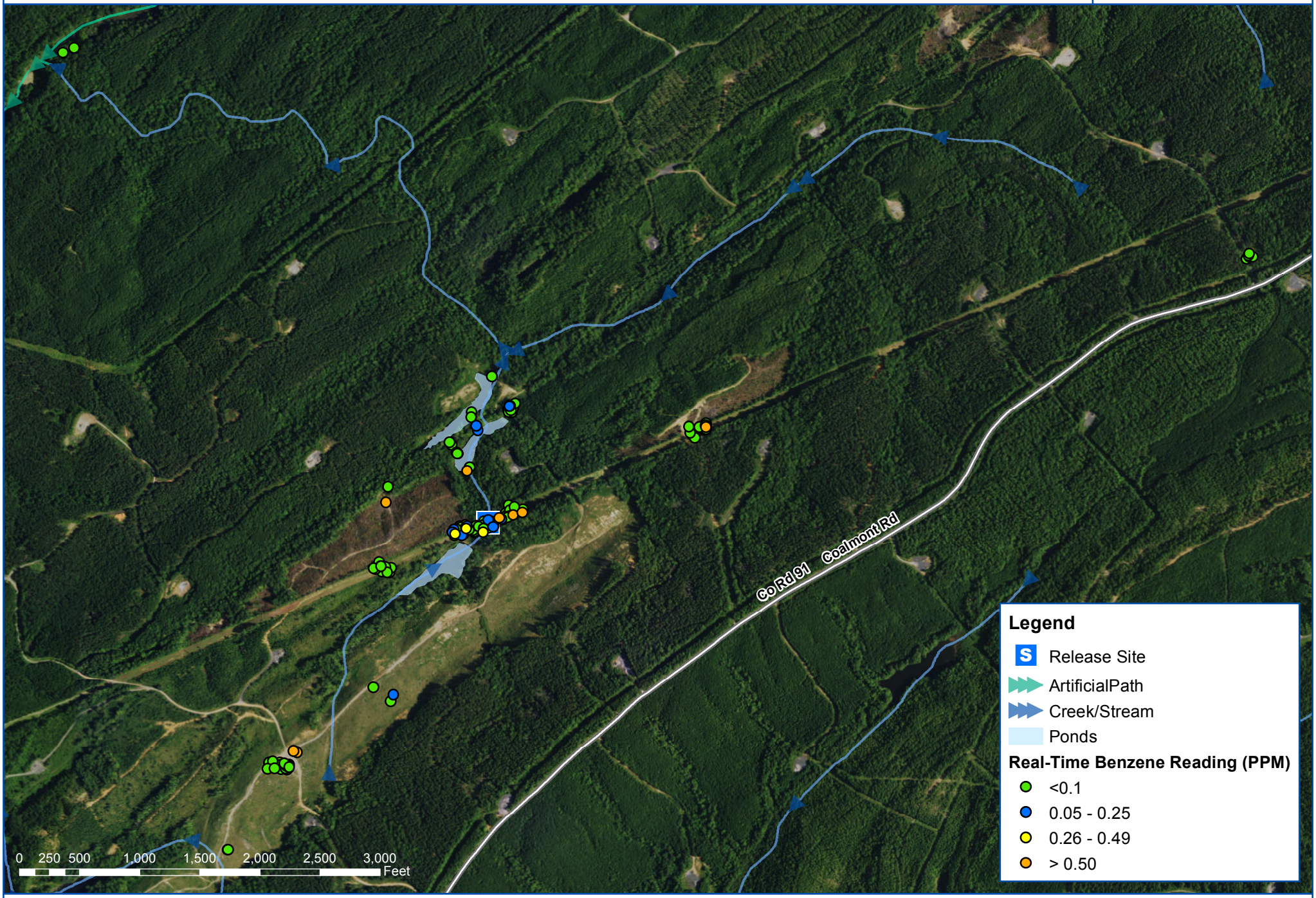

**PROJECTION SYSTEM:** *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/20/2016*

**GPS coordinates are approximate*

# Manually-Logged Real-Time Readings | Benzene

CR-91 Event | 09/19/2016 05:00 – 09/20/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



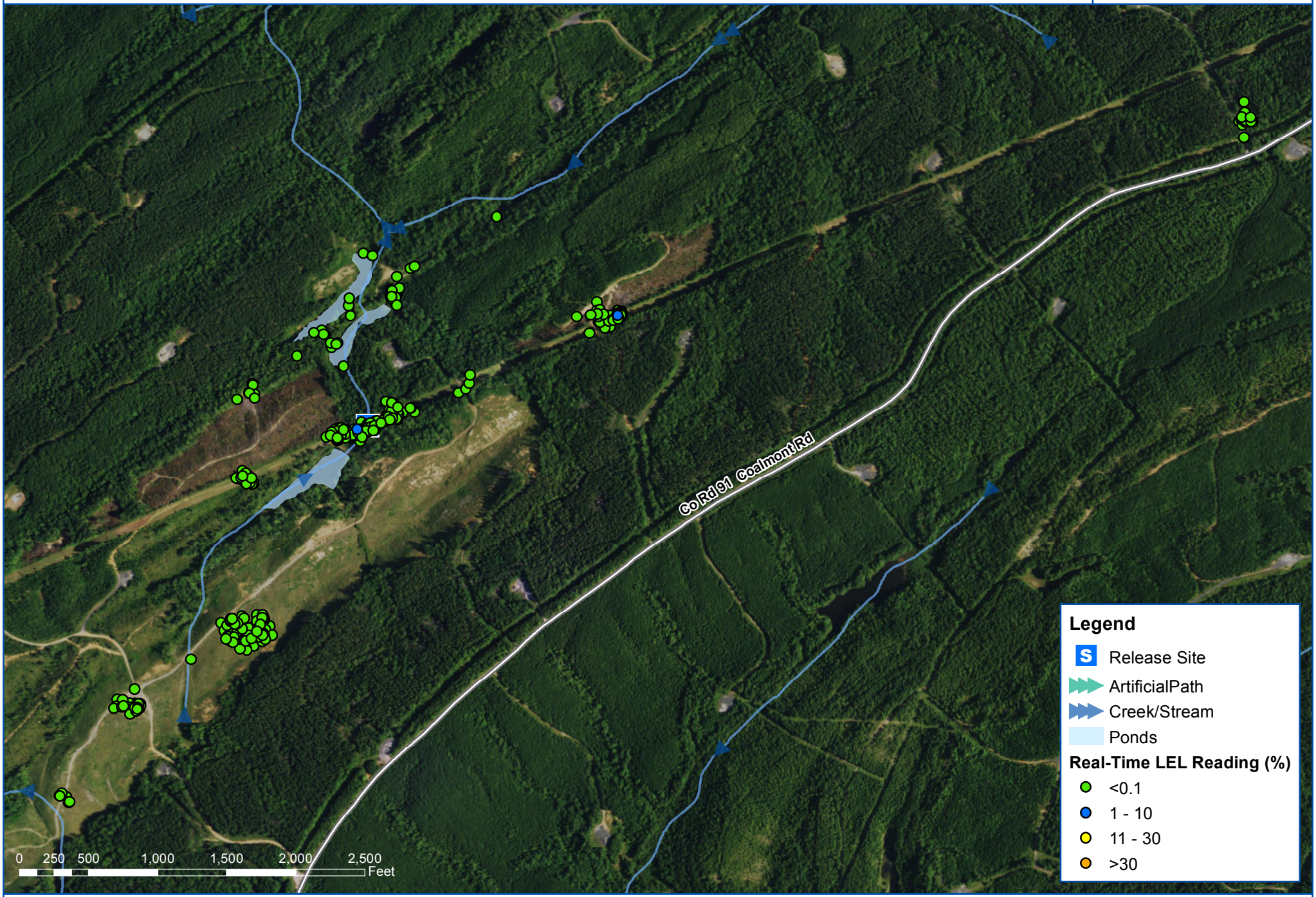

**PROJECTION SYSTEM:** *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/20/2016*

**GPS coordinates are approximate*

# Manually-Logged Real-Time Readings | LEL

CR-91 Event | 09/19/2016 05:00 – 09/20/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL



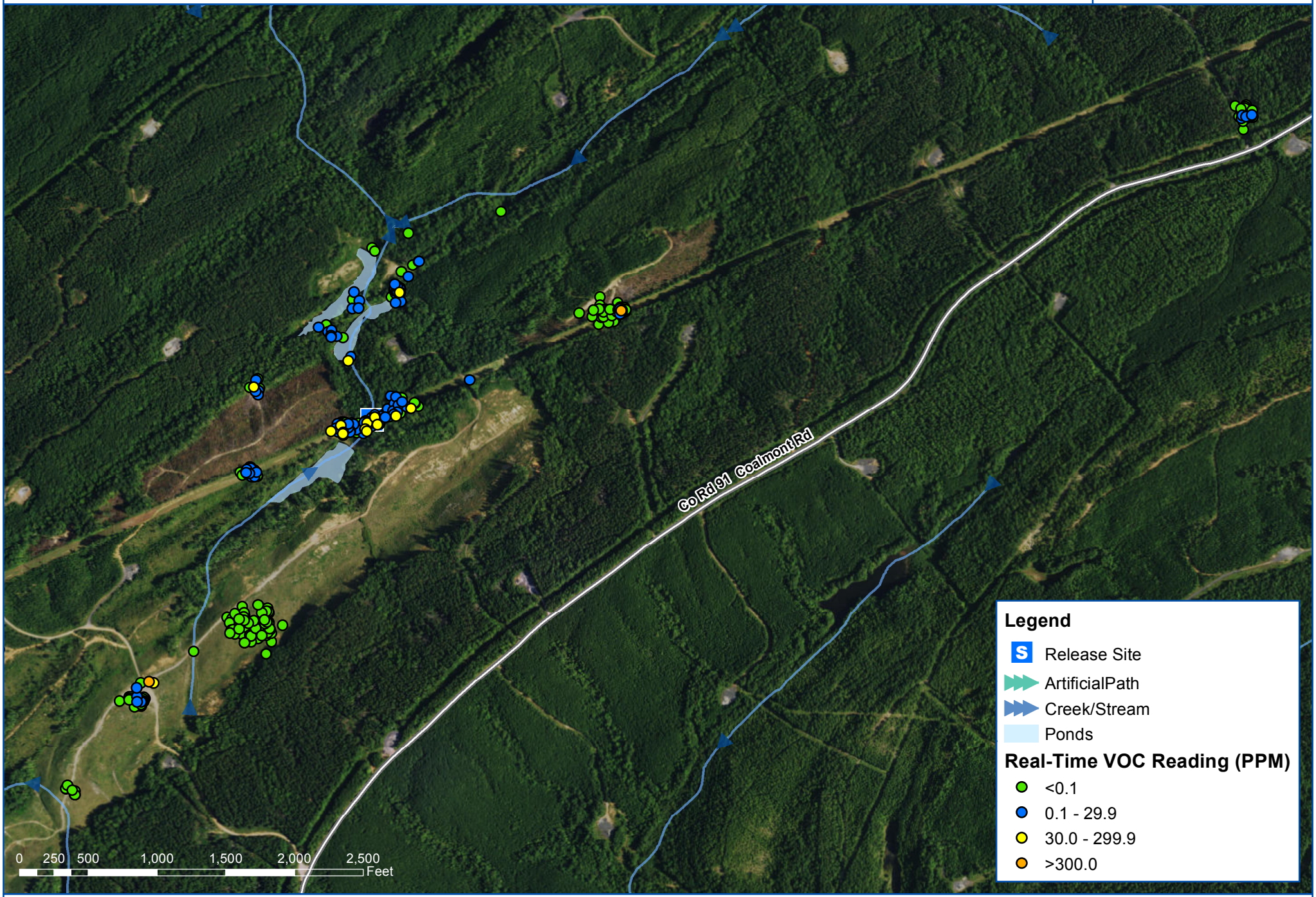

**PROJECTION SYSTEM:** *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/20/2016*

**GPS coordinates are approximate*

# Manually-Logged Real-Time Readings | VOC

CR-91 Event | 09/19/2016 05:00 – 09/20/2016 05:00

Project: 108465
Client: Colonial Pipeline
Location: Shelby County, AL




**PROJECTION SYSTEM:** *UTM Zone 16* **COORDINATE SYSTEM:** *WGS84* **Print Date:** *9/20/2016*

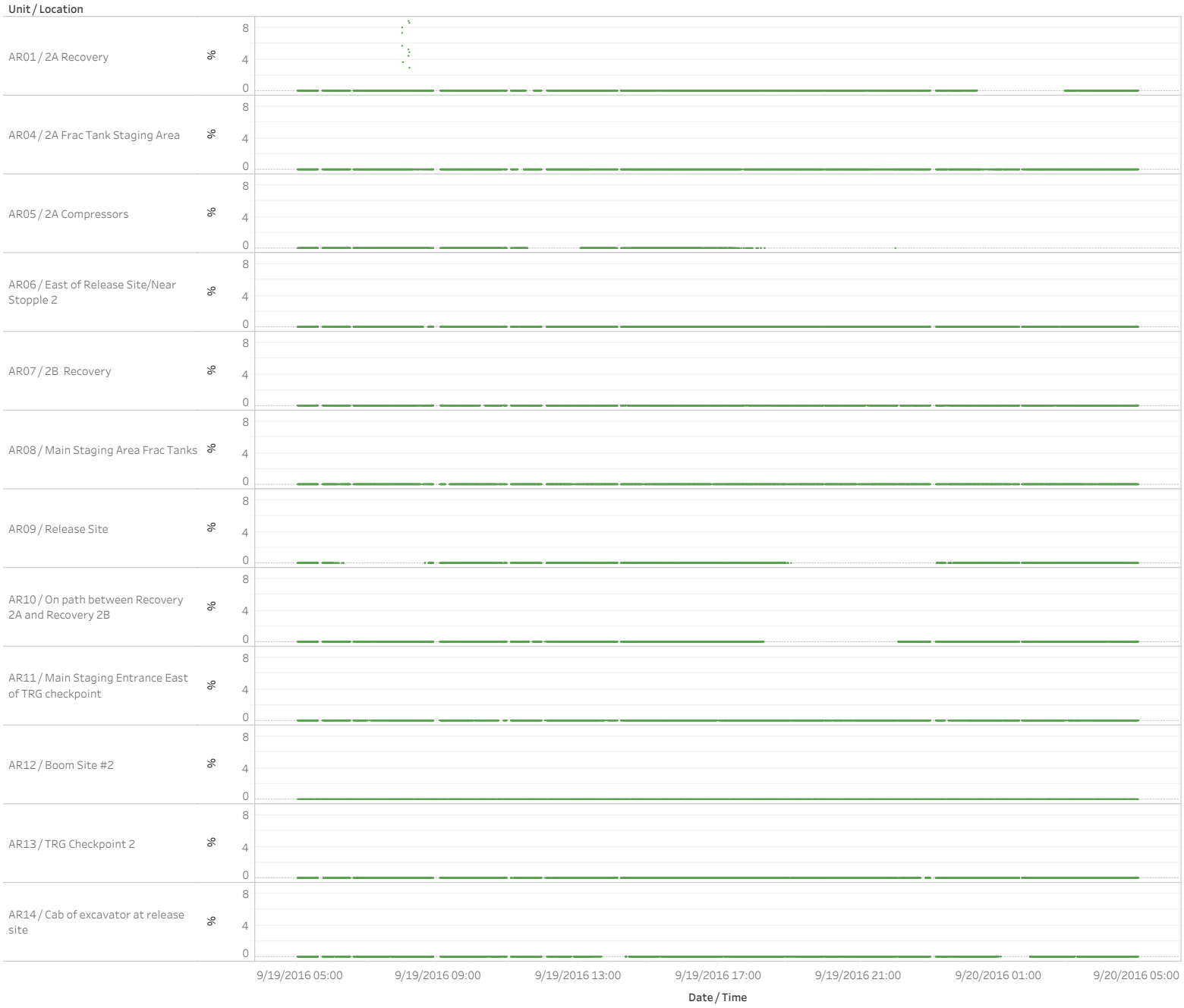
**GPS coordinates are approximate*

# Appendix II:

## Remote Telemetering Air Monitoring Graphs

# Remote Telemetering Real-time Air Monitoring | LEL

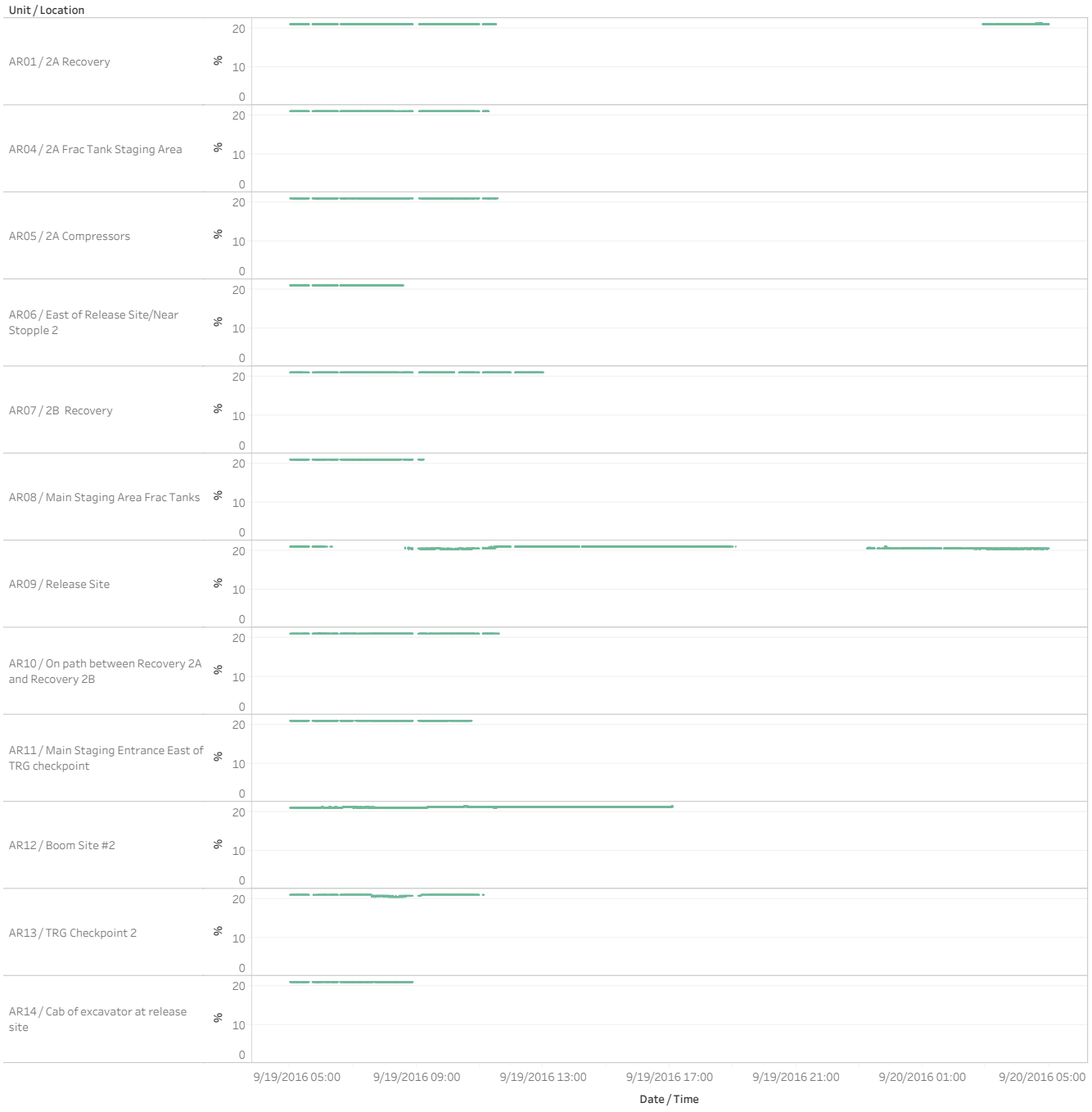
CR-91 Event | 9/19/2016 05:00 to 9/20/2016 04:59




LEL readings are a true representation of atmospheric conditions (appropriate correction factors have been applied to field values).

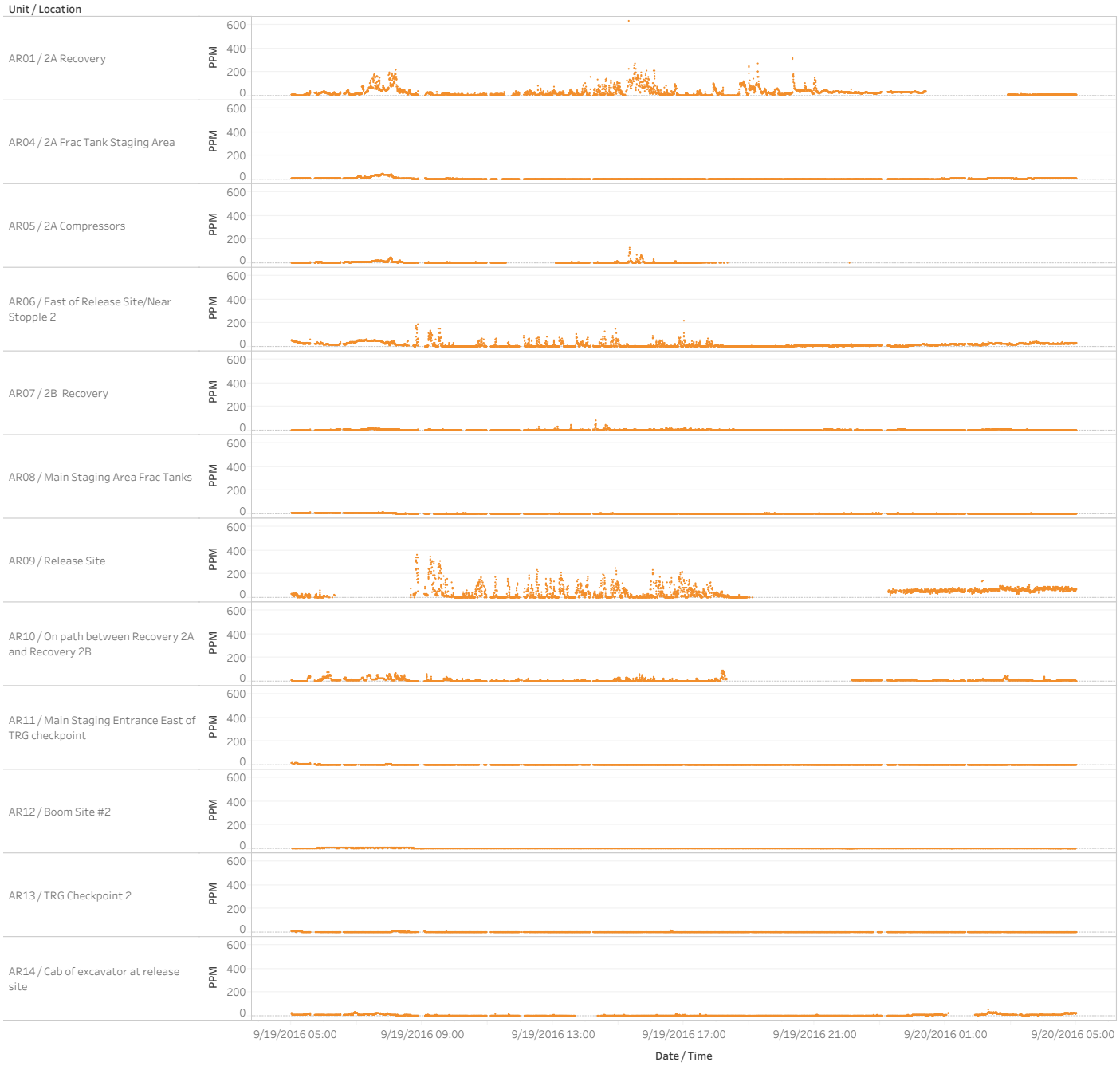
# Remote Telemetering Real-time Air Monitoring | Oxygen

CR-91 Event | 9/19/2016 05:00 to 9/20/2016 04:59



# Remote Telemetering Real-time Air Monitoring | VOC

CR-91 Event | 9/19/2016 05:00 to 9/20/2016 04:59




VOC readings are a true representation of atmospheric conditions (appropriate correction factors have been applied to field values).